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Docket No. 4590/4591 A (CIP)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Applicant: Hoke, et al.
Serial No.: 09/758,132
Date Filed: January 12, 2001
Art Unit: 1754
Examiner: T. Vanoy
Title: Catalyst and Adsorption Compositions Having Improved Adhesion Characteristics

July 12, 2002

Assistant Commissioner for Patents
Washington, DC 20231

Response to Office Action

Sir:

In response to the Office action mailed April 2, 2002, we respectfully request that the present application be reconsidered in light of the following arguments for patentability.

Applicants have discovered a novel structure that provides improved adhesion between catalytic or adsorption compositions coated on substrates, preferably metal substrates such as a motor vehicle radiator. Applicants found that MnO_2 catalytic compositions prepared with conventional acrylic-based polymer binders can suffer a loss of adhesion to metal substrates at typical auto radiator temperatures of less than 100°C. This adhesion degradation is unexpected since acrylic binders are known to be stable at temperatures exceeding 150°C (see page 83, lines 1-15 of the specification). Applicants have also discovered that when clays are mixed with catalyst compositions, they unexpectedly yet significantly improve the adhesion of such compositions under radiator operating temperatures with virtually no loss of catalytic activity (see Examples I-III on pages 86-92 of the specification). Likewise, Applicants discovered that, under

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Date: July 12, 2002

Sheila G. Bullock

Timely

radiator operating temperatures, silicone binders incorporated into acrylic-based catalytic or adsorption coatings provide a surprisingly dramatic metal-substrate adhesion improvement over such coatings without silicone binders. The silicone binders provide the adhesion promoting benefit with or without the addition of clay, and with minimal loss of catalytic activity (see Examples IV-VIII on pages 92-100 of the specification).

Claims 1, 2 and 6 have been rejected under 35 USC § 103(a) as being unpatentable over EP 0 351 036 A1 (EP '036). We traverse the rejection and respectfully submit that EP '036 does not teach or suggest the structure comprising a mixture coated on a substrate defined in claims 1, 2 and 6. A fundamental distinction is that EP '036 discloses a structure having catalyst-agglomerate bodies *integrated into* a structural material, while claims 1, 2 and 6 require a mixture *coated on* a substrate. The differences between integrated and coated products are described in EP '036. At page 2, lines 7-12, a typical coated product comprising a catalyst washcoat slurry coated on a substrate is described. The coating method results in catalyst being "integral only to the washcoat" such that washcoat-substrate bonding failures cause loss of catalyst (see EP '036, page 2, lines 9-12). Integrated structures, where catalyst is physically integrated *into* the substrate by mixing catalyst with a batch material, are contrasted with coated structures (see, e.g., page 2, lines 17-26 and 48-53 of EP' 036). The batch material engulfs the catalyst, thereby creating an integrated, as opposed to a coated, structure. EP '036 offers its own integrated structure as a solution to catalyst loss caused by washcoat-substrate bonding failure: the mechanical retention provided by the integrated structure requires no chemical interaction between the catalyst and structure material (see page 2, lines 50-53). Moreover, EP '036 notes that some of the catalyst in an integrated structure is necessarily "buried by the structure itself resulting in inaccessability of certain portions of the active catalyst" (page 2, line 22). This contrasts with a coated structure since "coating" is a surface application of material that does not create the inaccessability issues of the integrated structure.

The Office action fails to indicate what motivation one of ordinary skill in the art would have to modify the integrated structure of EP '036 to the coated structure required in the present claims. As described above, EP '036 clearly distinguishes the structures and offers its integrated structure as a superior alternative to a coated structure. Suggestions in the Office action that there is no distinction between integrated and coated structures is not only unsupported, but directly contradicted by the primary reference cited against the present application, EP '036.

Accordingly, we respectfully submit none of the present claims can properly be considered obvious over EP '036 because of the absence of motivation to modify the integrated EP '036 structure to the coated structure required in the present claims.

Claims 1-3, 6 and 8 have been rejected under 35 USC § 103(a) as being unpatentable over EP '036 in view of the English translation of DE 40 07 965 A1 (DE '965). DE '965 does not overcome the shortcomings of EP '036. Regarding claims 1-3, DE '965 provides no incentive for one of ordinary skill in the art select silicone as a binder from the "laundry list" provided in EP '036 (see, e.g., page 3, lines 47-48), admix the silicone with catalyst-agglomerate bodies as taught in EP '036, then selectively ignore the teaching of EP '036 by coating the admixture onto a radiator instead of mixing them with a batch material as taught in EP '036 (see page 3, lines 49-50). The only incentive to combine such element is found in the present application, which recognizes the advantage of using silicone and/or clay to improve the adhesion of a catalyst or adsorption composition. Regarding claims 6 and 8, they both require that a clay adhesion promoter be utilized, which is not suggested in either EP '036 (kaolin clay is taught as a ceramic batch material, see page 4, lines 8-9) or DE '965.

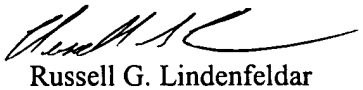
Claims 4, 5 and 7 have been rejected under 35 USC § 103(a) as being unpatentable over EP '036 in view of DE '965 and U.S. Patent No. 5,208,198 (US '198). We respectfully traverse the rejection (as well as any extension of the rejection to claims 6 and 8, which also require the use of clay) for the reason discussed in the previous response submitted on February 26, 2002: EP '036 requires the use of organic binders that burn out during sintering, and the use of clay as required in claims 4-8 is incompatible with that requirement. EP '036 acknowledges the catalyst accessibility problems that plagued earlier integrated-catalyst products, wherein no contact occurs between potential reactants in the effluent and catalyst completely engulfed by the structure (see page 2, lines 21-22 of EP '036). EP '036's solution requires use of heat-degradable organic binders, which burn-out during sintering. "The organic binder burnout leaves microchannels and passageways in the structure which allow for the passage of fluids to and from the active catalysts" (page 4, lines 34-36 of EP '036). Clay, being inorganic and highly heat resistant (note that kaolin clay is suggested as a ceramic batch material on page 4, lines 8-9 of EP '036), would not burn-out during sintering. Therefore, one of ordinary skill in the art would not utilize clay as a binder in the EP '036 structure because the clay would remain after sintering, thereby inhibiting or blocking effluent access to the catalyst.

It is argued in the Office action that lines 37-44 on page 4 of EP '036 describes a process that does not require a sintering step. We respectfully submit that this small portion of the text does not describe the complete process. It would be readily recognized by those of ordinary skill in the art that the batch materials described throughout EP '036, including the manganese cordierite glass powder and stainless steel powder batch materials described on page 4, line 40, *must* be sintered at high temperatures to bond the grains together into a solid structure. Otherwise, the batch material/catalyst-agglomerate body/organic binder mixture would easily break apart after extrusion and drying, and could not be used in real-world applications such as those described on page 3, lines 15-16 of EP '036. Note that all of the examples in EP '036 utilize a high-temperature sintering step (see page 5, lines 23 and 42-43, and page 6, lines 10-11). We also direct the examiner's attention to the enclosed copy of "Two minute course in ceramics" from the Swedish Ceramics Institute, which describes the required sintering under the "Manufacturing" section.

In light of the foregoing, we respectfully submit that the claims define a novel and nonobvious invention that merits patent protection. We therefore respectfully request that the entire application be allowed at an early date. If there remain any outstanding issues that the Examiner believes can be addressed through discussion, we cordially invite the Examiner to contact the Applicants' undersigned representative at the telephone number provided below.

This response is being filed after the three month anniversary of the April 4, 2002 Office action mailing date, but before the four month anniversary of that date. A request for a one-month extension of time for response along with authorization to charge deposit account 05-1070 for the appropriate fee is filed herewith. However, in the event such request and authorization is missing, we hereby request that a one-month extension for response be granted and authorize to the charging of the appropriate fee to deposit account 05-1070. No other fee is believe to be required, but if any additional fee is required, authorization is hereby granted to charge any such fee to deposit account 05-1070.

Respectfully submitted,



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